

Humanity is cutting down its forests apparently oblivious to the fact that we may not be able to live without them.

Isaac Asimov

Isaac Asimov's Book of Science and Nature Quotations, 1988

Forum

Fluoridation Debate

Citizens for Safe Drinking Water, a San Diego, California, group opposed to fluoridation as a means of preventing tooth decay, is trying to repeal the state's 1995 mandatory fluoridation law by gathering enough signatures to place an initiative before the voters. David Kennedy, a biochemist and part-time dentist in San Diego who is also president of the 4,000-member organization, points to studies concluding that fluoridation causes health problems and doesn't reduce tooth decay.

Among Kennedy's supporters is EPA chemist William Hirzy, who is backing the initiative in his capacity as an officer in the National Federation of Federal Employees. Arrayed against Kennedy and others opposed to fluoridation are scientists who claim fluoridated water is beneficial and nontoxic.

The practice of adding fluoride to tap water began in 1945. In the United States today, the tap water for approximately 134 million people has fluoride added to it, according to the CDC, and about 10 million people drink water that naturally contains the chemical. The reported optimal amount of fluoride is between 0.7 and 1.2 parts per million. A 1991 Public Health Service report credited community water fluoridation as being responsible for 20–40% fewer dental cavities compared with nonfluoridated areas.

Though fluoride can be directly applied to teeth or used in mouth rinses, community water fluoridation is "a remarkably efficient way of controlling dental caries at the commu-

nity level," says Lawrence Furman, a dentist and scientist at the National Institute of Dental Research. "Fluoridated water reaches everybody, that's why we need it," argues epidemiologist Brian Burt of the University of Michigan in Ann Arbor. But making fluoride so ubiquitous bothers opponents. Kennedy cites a number of studies that conclude that drinking fluoridated water is responsible for increased hip fractures. Some research indicates that fluoride may build up in bones over a lifetime and make them brittle, leaving the elderly particularly at risk for fractures. Other studies, however, have not supported this conclusion.

But studies on both sides of the issue have flaws, says Thomas Reeves, a fluoridation engineer at the CDC. For instance, a 10-year study reported in the 12 August 1992 issue of the *Journal of the American Medical Association* compared the incidence of hip fractures in residents of a fluoridated locality with the incidence in two nonfluoridated localities. The researchers concluded there was a link between water fluoridation and the fractures. The conclusion, Reeves says, is flawed for 3 of the 10 years because fluoride was not actually added to water in the so-called fluoridated locality. Furthermore, the studies show only slight differences in either direction, he said, adding that the CDC's official position is that more research is needed. But some say that the most compelling weakness of the *JAMA* study is the fact that it is an ecologic study, in which the characteristics of the group as a whole, rather than those of the individual constituents of the group, were studied, conceivably leading to the derivation of inaccurate inferences.

Fluoridation opponents point to an even more dire alleged consequence of fluoridating water—osteosarcoma, a form of bone cancer. They cite studies done in New Jersey as linking fluoridated water with this rare cancer in the United States. But Burt argues those analyses are statistically faulty. And the most recent animal studies performed by the National Toxicology Program failed to find a link.

Another point of contention raised by fluoridation opponents is dental fluorosis, the mottling of teeth that can result from drinking water containing fluoride from multiple sources. While Kennedy argues that

dental fluorosis is a marker for serious internal problems caused by fluoride, Reeves, Furman, and other fluoride proponents disagree and state that the mild dental fluorosis that can occur from drinking fluoridated water is often detectable only by trained dentists. Reeves does acknowledge that, because fluoridated water is used in many products that people eat and drink, the incidence of dental fluorosis has been increasing. "We're seeing [dental fluorosis in] 7, 8, and 10% [of the population]," says Reeves. "A certain percent of the population may be getting too much."

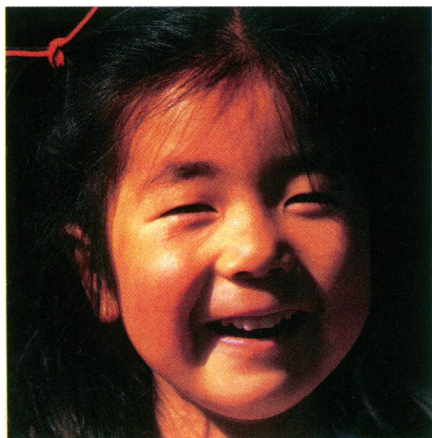
Some scientists, says Reeves, suspect the high fluoride content of many toothpastes is a major reason for dental fluorosis. There is some discussion among fluoride specialists, he says, of lowering the dose in toothpastes aimed at young children for this reason, and also because some scientists worry that young children who swallow fluoride toothpaste may become ill.

The opposite concern—that children are getting too little fluoride—has also surfaced. A number of dental specialists fear the increased consumption of nonfluoridated bottled water may lead to increases in dental cavities. But there are currently no data to support this contention. Meanwhile, the debate over fluoridation of water continues.

An Enlightened Approach to Screening for Dioxins

Scientists recently had a bright idea about how to screen for environmental toxins. Researchers at the University of California at Davis have developed a bioassay system to detect polyhalogenated aromatic hydrocarbons such as dioxins in environmental samples. Dubbed the CALUX (for chemically activated luciferase gene expression) system, the assay is based on recombinant cell lines into which researchers have inserted the firefly luciferase gene. When exposed to dioxin-like compounds, the recombinant cells luminesce.

Polyhalogenated aromatic hydrocarbons are a diverse group of compounds that are widespread in the environment. Exposure to these compounds can lead to carcinogenesis, liver toxicity, birth defects, damage to the immune system, skin lesions, and even death. "Given the ubiquitous presence of these toxic



Unsafe smiles? A California-based group is pushing to repeal mandatory fluoridation laws, citing health concerns.